CLAIMS

1. A method of generating information about particulates present in a fluid, comprising:

filtering the fluid through a substrate, the particulates being retained on the substrate during the filtering;

after the filtering, scanning across at least a portion of the substrate with a microscope, the scanning comprising automated displacement of the substrate relative to an observing portion of the microscope along a pattern, the microscope obtaining data about said particulates at locations along the pattern; and

digital image processing of the data obtained by the microscope to generate information about said particulates.

2. The method of claim 1 wherein the fluid is a liquid.

3. The method of claim 1 wherein the fluid is a gas.

4. The method of claim 1 wherein the generated information is information about one or more of the size, quantity and shape of the particulates.

5. The method of claim 1 wherein the generated information is information about a type of the particulates.

6. The method of claim 1 further comprising:

determining a relative contrast of two or more of the particulates; and

sorting the particulates amongst two or more types based upon the relative contrast.

7. The method of claim 6 wherein the determining a relative contrast of the particles comprises one or more of determining: (1) contrast of the particles relative to a background defined by the substrate, (2) color of the particles, (3) fluorescence of the particles, (4) response of the particles to electrons, (5) response of the particles to photons, (6) response of the particles to x-rays, and (7) response of the particles to particle beams.

8. The method of claim 1 wherein the microscope is a light microscope, and further comprising sorting the retained particulates into a group which appears darker than the substrate in the obtained data and another group which appears lighter than the substrate in the obtained data.

9. A method of generating information about materials present in a composition, comprising:

utilizing a reagent to dissolve at least a portion of the composition and thereby form a mixture;

filtering the mixture through a substrate, at least some components of the mixture being retained on the substrate during the filtering;

after the filtering, scanning across at least a portion of the substrate with a microscope to obtain one or more images of the substrate; and

digital image processing of the one or more images to generate information about said retained components.

10. The method of claim 9 wherein the generated information is information about one or more of the size, type, quantity and shape of the retained components.

11. The method of claim 9 wherein the mixture comprises an emulsion of silicon, dissolved metal, and non-dissolved particulates; and wherein the silicon is passed through the substrate while at least some of the non-dissolved particulates are retained on the substrate as said components.

12. The method of claim 9 further comprising sorting the retained components by one or more of: (1) contrast relative to a background defined by the substrate, (2) color, (3) fluorescence, (4) response to electrons, (5) response to photons, (6) response to x-rays, and (7) response to particle beams.

13. The method of claim 9 wherein the microscope is a light microscope, and further comprising sorting the retained components amongst a first group which appears darker than the substrate in the obtained images and a second group which appears lighter than the substrate in the obtained images.

14. A method of generating information about materials present in a composition, comprising:

utilizing a reagent to disperse at least a portion of the composition and thereby form a dispersion of undissolved material in a solution;

filtering the dispersion through a substrate, at least some of the undissolved material being retained on the substrate during the filtering;

after the filtering, scanning across at least a portion of the substrate with a microscope, the scanning comprising automated displacement of the substrate relative to an observing portion of the microscope along a grid pattern, the microscope obtaining data about said retained undissolved material at locations along the grid pattern; and

processing the data obtained by the microscope to generate information about one or more of the size, shape, type and quantity of the undissolved material.

15. The method of claim 14 wherein the generated information is information about one or more of the size, type, quantity and shape of the undissolved material.

16. The method of claim 14 wherein the composition is a portion of a sputtering target.

17. The method of claim 14 wherein the processing calculates a concentration of the undissolved material in the composition.

18. The method of claim 14 wherein the undissolved material comprises one or more oxides, and wherein the processing calculates the concentration of oxides in the composition.

19. The method of claim 14 wherein the undissolved material comprises aluminum oxide, and wherein the processing calculates the concentration of aluminum oxide in the composition.

20. The method of claim 14 wherein the undissolved material comprises carbon, and wherein the processing calculates a concentration of carbon in the original composition.

21. The method of claim 14 wherein the dispersion comprises non-dissolved particulates and silicon in the solution; wherein the solution comprises dissolved metal; and wherein the silicon is passed through the substrate while at least some of the non-dissolved particulates are retained on the substrate as said retained undissolved material.

22. The method of claim 14 wherein the processing comprises digital image processing.

23. The method of claim 14 wherein the solution comprises one or more metals; and wherein the retained undissolved material comprises one or more oxides.

24. The method of claim 14 wherein the solution comprises one or more metals; and wherein the retained undissolved material comprises carbon.

25. The method of claim 14 wherein the solution comprises one or more of aluminum, copper, lead, antimony and silicon.

26. The method of claim 14 wherein the solution comprises one or more metals, the only metals in the solution being selected from the group consisting of one or more of aluminum, copper, lead, and antimony.

27. The method of claim 14 wherein the solution comprises aluminum.

28. The method of claim 14 wherein the solution comprises aluminum and copper.

29. The method of claim 14 wherein the only metals in the solution are selected from the group consisting of one or both of aluminum and copper.

30. The method of claim 14 wherein the solution comprises copper.

31. The method of claim 14 wherein the solution comprises copper and silver.

32. The method of claim 14 wherein the solution comprises lead.

33. The method of claim 14 wherein the microscope is a light microscope.

34. The method of claim 14 wherein the microscope is an electron microscope.

35. A method of generating information about materials present in a composition, comprising:

selectively dissolving some components of the composition in a reagent while leaving other components undissolved;

collecting at least some of the undissolved components on a filter surface;

scanning across at least a portion of the filter surface with a light microscope, the scanning comprising automated displacement of the filter surface relative to an observing portion of the microscope along a grid pattern, the microscope obtaining data about scattering of light by the undissolved components on the filter surface, the undissolved components comprising at least two types, a first of the two types being darker than a background defined by the filter surface and a second of the two types being lighter than the background; and

digital image processing of the data obtained by the microscope to generate information about one or more of the size, quantity and aspect ratio of the undissolved components; the processing comprising a sort of the undissolved components amongst the two types.

36. The method of claim 35 wherein the composition is a metal having inclusions dispersed therein; wherein the dissolved components of the composition comprise the metal; and wherein the undissolved components comprise the inclusions.

37. The method of claim 35 further comprising displaying results of the processing as a histogram showing undissolved components by one or more of type, size and aspect ratio.

38. The method of claim 35 wherein the dissolved components of the composition comprise one or more metals; and wherein the undissolved components comprise one or more oxides.

39. The method of claim 35 wherein the first type of undissolved components predominately comprise carbon and wherein the second type of the undissolved components predominately comprise one or more oxides.

40. A method of generating information about impurities present in a metal composition, comprising:

utilizing a reagent to selectively dissolve a portion of the composition relative to at least some impurities present in the metal composition, the dissolved portion forming a solution with the reagent; the impurities being at least two different types; one of the at least two types being a first type and another of the at least two types being a second type;

filtering the solution through a substrate, at some of the first and second types of the impurities being retained on the substrate during the filtering;

after the filtering, scanning across at least a portion of the substrate with a light microscope, the scanning comprising automated displacement of the substrate relative to an observing portion of the microscope along a grid pattern, the microscope obtaining data about the impurities at locations along the grid pattern, the data including a relative darkness of the impurities relative to a background defined by the substrate; the first type of impurities being darker than the background and the second type of impurities being lighter than the background; and

processing the data obtained by the microscope to generate information about the size, quantity and type of the impurities.

41. The method of claim 40 further comprising displaying results of the processing as a histogram showing impurities by one or more of type, size and quantity.

42. The method of claim 40 wherein the processing of the data obtained by the microscope comprises digital image processing.

43. The method of claim 40 wherein the dissolved portion of the metal composition comprises a mixture of aluminum and copper, and wherein the reagent is an acid comprising a mixture of hydrochloric acid and nitric acid.

44. The method of claim 40 wherein the first type of impurities predominately comprise carbon and wherein the second type of impurities predominately comprise one or more oxides.

45. A method of generating information about impurities present in a metal composition, comprising:

utilizing a reagent to selectively dissolve portions of the composition relative to at least some impurities present in the metal composition, the dissolved portions forming a solution with the reagent;

filtering the solution through a substrate, at least a portion of the impurities being retained on the substrate during the filtering;

after the filtering, mounting the substrate to a holder and scanning across at least a portion of the substrate with a microscope, the scanning comprising one or both of an actuated holder and an actuated microscope lens mounted to automate displacement of the substrate relative to the microscope lens along a grid pattern, the microscope obtaining data about the impurities at locations along the grid pattern; and

digitally analyzing the data obtained by the microscope to generate information about the size and quantity of the impurities.

46. The method of claim 45 wherein the reagent is an acid comprising a mixture of hydrochloric acid and nitric acid.

47. The method of claim 45 wherein the substrate defines a background against which a first type of impurity is darker and a second type of impurity is lighter, and further comprising distinguishing the first and second types of impurities from one another during the analyzing.

48. The method of claim 45 wherein the impurities comprise a first type of impurity and a second type of impurity which is different than the first type of impurity, and wherein the data obtained by the microscope is utilized to distinguish the first and second types of impurities from one another during the analyzing.

49. The method of claim 48 further comprising modifying at least one of the first and second impurities after utilizing the reagent and prior to the scanning.

50. A method of generating information about different types of impurities present in a metal composition, comprising:

providing the metal composition as a block having a first outer surface;

etching the metal composition block with a first acid solution to remove the first outer surface and expose a second outer surface;

after the etching, dissolving metallic portions of the composition in a second acid solution while leaving at least some non-metallic impurities not dissolved;

filtering the second acid solution through a substrate, at least some of the non-dissolved non-metallic impurities being retained on the substrate during the filtering, the filtering comprising flowing the solution through at least part of the substrate to form a flow pattern on the substrate;

sub-dividing the flow pattern into a grid pattern, the grid pattern defining points at which a light microscope will scan a surface of the flow pattern, the grid pattern defining a sufficient number of points for the microscope to scan at least 5% of the flow pattern surface;

after the filtering, scanning across at least a portion of the substrate with the light microscope, the scanning comprising automated displacement of the substrate relative to a lens of the microscope along the grid pattern, the microscope obtaining data about the impurities at the points along the grid pattern; and

digitally analyzing the data obtained by the microscope to generate information about the size, quantity and type of the impurities.

51. The method of claim 50 wherein the substrate comprises a predominate pore size of less than or equal to 0.4 microns.

52. The method of claim 50 wherein the metallic portions of the composition comprise aluminum and copper, and wherein the first acid solution comprises hydrochloric acid and nitric acid.

53. The method of claim 50 wherein the metallic portions of the composition comprise aluminum and copper, and wherein the second acid solution comprises hydrochloric acid and nitric acid.

54. The method of claim 50 wherein the substrate defines a background against which a first type of impurity is darker and a second type of impurity is lighter, and further comprising distinguishing the first and second types of impurities from one another during the analyzing.

55. The method of claim 50 wherein the metal composition block is obtained from a cast material.

56. The method of claim 50 wherein the metal composition block is obtained from a sputtering target.

57. The method of claim 50 wherein the metal composition block is obtained from a solder.

58. The method of claim 50 wherein the flow pattern has a substantially circular outer periphery, and wherein the grid pattern substrate has a substantially octagonal outer periphery.